

Heat Injury Prevention Briefing

Objectives

- Soldiers are able to describe how the body handles heat to include; conditions affecting body heat, heat gain or loss, effects of heat stress and the body's cooling system
- Soldiers can describe the causes, symptoms, and apply initial first aid to Soldiers that are victims of minor heat stress disorders. Soldiers are able to describe prevention measures.
- Soldiers can describe the causes, symptoms, and apply initial first aid to Soldiers that are victims of major heat stress disorders. Soldiers are able to describe prevention measures.
- Soldiers can describe factors that control heat stress.

Summer is quickly approaching. It is our responsibility as commanders, leaders, and instructors to ensure that we protect the force. By conducting heat injury prevention and treatment of heat injuries training for our Soldiers, we provide them with valuable information which minimizes hot weather injuries.

Heat Stress

High temperatures put stress on our bodies. The body's cooling system has to work hard to reduce the effects of heat stress. This physical strain -- combined with other stresses such as energy loss and heat production through physical work and loss of fluid from sweating -- may lead to heat disorders, disability, or even death.

The Hazard of Heat Stress

In addition to the medical hazards of bodily illness or injury caused by heat stress, there is also a higher frequency of accidents in hot environments.

- Direct causes of accidents include;
 - Fogged glasses
 - Sweat in the eyes
 - Slippery hands
 - Dizziness or fainting
- Indirect causes of accidents include;
 - Physical discomfort
 - Fatigue
 - Irritability and anger
 - Poor judgment
 - Diverting attention from the job
 - Slower mental and physical job reactions

Coping with the hazards

Heat disorders are preventable with proper planning, supervision and training. Steps you can take to cope with the hazards of heat stress include:

- Understanding the effects of heat stress.
- Knowing the symptoms and treatment for heat stress disorders.
- Taking personal precautions against heat disorders.

How the Body Handles Heat

Conditions Affecting Body Heat

To understand the effects of heat stress you need to know how the body handles heat. Your body always generates internal heat, but the amount of heat that stays stored in your body depends on your:

- Surroundings
- Level of physical activity
- Type of work
- Time spent working
- Recovery time between work periods
- Ability of the body to dissipate heat (clothing, ability to sweat).

How the Body Handles Heat (cont.)

Heat Gain or Loss

Your body has a thermoregulation-or heat control-mechanism that tries to keep its inner temperature at a constant 98-99 degrees Fahrenheit. The body loses heat in four ways:

- Radiation - transfers heat to or from surrounding objects that are not in direct contact with the body.
- Convection - transfers body heat to or from air moving over the skin.
- Conduction - is direct contact with objects that are colder or warmer than the body.
- Evaporation - causes cooling by loss of heat used to vaporize body moisture from the lungs or skin.

How the Body Handles Heat (cont.)

Heat Gain or Loss

The amount and speed of heat gain loss depends on:

- Temperature of the air and surrounding objects.
- Air movement (wind or fans).
- Humidity (amount of water vapor in the air).

How the Body Handles Heat (cont.)

Effects of Heat Stress

While resting, the body loses 75 percent of its heat through conduction, convection or radiation from the blood flow at the skin surface. However, as internal body heat rises as the result of work or high temperatures, blood flow to the skin increases and the pulse rate goes up, putting a strain on the heart and circulatory system.

How the Body Handles Heat (cont.)

Your Body's Cooling System

- When more blood is pumped close to the skin, less blood goes to the brain. Bending, squatting or standing up suddenly can result in dizziness or a momentary blackout, which could cause secondary injuries or accidents at a job site.
- If the temperature of the air and surrounding objects in your work area rises above body temperatures, then conduction, convection and radiation cause the body to gain heat instead of losing it. The evaporation of sweat becomes the body's most important-and sometimes only-cooling method.

How the Body Handles Heat (cont.)

Your Body's Cooling System

- But sweating can also make things worse by causing you to lose body fluids and salt. Most people will lose about a quart of sweat an hour while working in extreme heat. This puts even more strain on the circulatory system since it actually lowers the volume of blood in your body.
- And just because you're sweating, you may not be getting rid of heat, since sweat must evaporate to cool your body. Normally, the faster the air moves over your body, the more sweat evaporates. But if the air is too full of water vapor to absorb any more, you can work directly in front of a fan and still not lose sufficient heat to keep cool.

How the Body Handles Heat (cont.)

Your Body's Cooling System

- Finally, if your body's natural defenses against heat are pushed beyond their limits, they may simply shut down, leading to an uncontrolled and explosive rise in body temperature that can cause heat stroke, permanent damage to the central nervous system or death.

Minor Heat Stress Disorders

Sunburn

Sunburn is often overlooked as a danger when working outdoors in direct sunlight. Besides the discomfort of the burn itself, sunburn can prevent your body from eliminating heat efficiently and can contribute to one of the more dangerous heat disorders.

- Cause

- Exposure of unprotected skin to ultraviolet light.

- Symptoms

- First degree-red, painful skin.
- Second degree-blistering and/or peeling.

- Treatments

- Skin lotions.
- Topical anesthetics
- Staying in a shaded area.

- **PREVENTION IS THE KEY**

- Limit exposure on bare skin.
- Use sunscreen instead of tanning lotion.

Minor Heat Stress Disorders

Heat Rash

Heat rash, also known as prickly heat, is another minor annoyance that can lower the body's ability to lose heat.

- Cause
 - Hot, humid environment.
 - Sweat won't evaporate.
 - Skin stays wet most of the time.
- Symptoms
 - Red rash
 - Itching
- Treatment
 - Ointment
- Prevention
 - Bathe regularly.
 - Keep skin clean and dry

Major Heat Stress Disorders

Heat Cramps

Heat cramps are always a danger signal since they may occur alone or be combined with one of the other major heat stress disorders. These are painful-sometimes severe-cramps of the muscles used while working, such as the arms, legs, back, or abdomen.

- Cause
 - Sweating heavily
 - Replacing water but not salt.
- Symptoms
 - Sudden onset of muscle cramping.
 - Normal pulse.
 - Normal to slightly high body temperature
- Prevention
 - Move into the shade or improvise.
 - Loosen clothing.
 - Drink lightly salted liquids
 - Wait to see if symptoms go away
 - Seek medical aid if the cramps persist.

Major Heat Stress Disorders

Heat Exhaustion

Heat exhaustion occurs when the body's heat-control mechanism is overactive but hasn't broken down completely. The victim may also be having heat cramps, and there is a high risk that the victim will continue on to a state of heat stroke. This disorder also causes special risk to older personnel or those with coronary artery disease or emphysema.

- Cause
 - Surface blood vessels that enlarged to cool the blood collapse from loss of body fluids and minerals.
- Symptoms
 - Heavy sweating
 - Intense thirst from dehydration.
 - Weak and rapid pulse (120 to 200)
 - Low to normal blood pressure.
 - Fatigue, weakness or loss of coordination.
- Other Symptoms of Heat Exhaustion
 - Anxiety or agitation.
 - Clouded senses, impaired judgment, fainting.
 - Tingling in hands and feet, headache.
 - Loss of appetite, nausea or vomiting.
 - Hyperventilation (rapid breathing or panting).

Major Heat Stress Disorders

Heat Exhaustion (cont.)

- First-aid Treatment
 - Move the victim into the shade.
 - Loosen or remove clothing and boots.
 - Cool the victim as fast as possible.
 - Fan the victim.
 - If necessary, pour water on the victim
 - Elevate the victim's legs and massage limbs.
 - Have the victim drink water-with salt, if available.
 - Stay with the victim until medical aid arrives.

Victims of heat exhaustion must be examined by a qualified medical practitioner and should not participate in strenuous activity for the rest of the day. Bed rest and restoration of body water and salt usually are all the treatment needed.

Major Heat Stress Disorders

Heat Stroke

Heat stroke is a medical emergency requiring immediate medical attention. Outwardly, it may first progress through the symptoms of heat cramps and/or heat exhaustion, with a dramatically sudden onset of heat stroke symptoms followed by rapid deterioration of the victim.

- Cause
 - When the body's cooling mechanisms fail, rising internal body temperature begins to damage internal organ systems. Death can result if the internal temperature remains high.
- Early Symptoms of Heat Stroke
 - High body temperature -- usually above 104 degrees F.
 - Confusion or delirium.
 - Bizarre behavior.
 - Rapid pulse.
 - Difficult breathing.
 - Headache or dizziness.
 - Weakness, nausea or vomiting.

Major Heat Stress Disorders

Heat Stroke (cont.)

- Advanced Symptoms
 - Seizure or convulsions.
 - Collapse.
 - Loss of consciousness.
 - Deep coma.
 - No detectable pulse.
 - Body temperature over 108 degrees F.
- First-aid Treatment

The most important step is prompt recognition of heat stroke symptoms and immediate treatment.

- You must lower the victim's body temperature as fast as possible.
- Immerse him in cold water.
- Don't give liquids to unconscious victims.
- Call an ambulance and evacuate the victim to a hospital.

Controlling Heat Stress

Acclimatization

- If you can't control temperature or humidity in your workplace, you must become acclimatized to it. Acclimatization is the ability to perform a maximum amount of strenuous work in the heat by gradually getting yourself used to the climate you work in.
- First, get yourself into good physical condition. Physical work in the heat is necessary for full acclimatization, but it should consist of increasingly longer work periods each day, alternating with rest or lighter work.
- Some workers reach full acclimatization within a week, while others take longer. But if you go on vacation, remember that you will start losing your resistance to heat after one week and you'll lose it completely in a month.

Controlling Heat Stress

Work Procedures

- Another important method for reducing the ill effects of heat stress is to follow schedules work/rest cycles that keep any individual from overdoing it. In this case, rest means minimal activity, not stopping work completely. Workers may alternate light and heavy work, indoor and outdoor work, etc. Duties may also be rotated among several workers to protect them from heat, and workload can be adjusted on body size or physical strength.
- Exertional heat illness is produced primarily by working people too hard, too fast, and/or too long for their physical and medical state and the environmental conditions.

Controlling Heat Stress

Food and Water Intake

- Heavy meals reduce your ability to get rid of heat because they redirect blood flow to your digestive tract instead of your skin surface. Be sure your noon meal is light and cool, then try to rest for a while right after eating. Plan your heaviest meal of the day for evening after the workday is over.
- Fluid intake should replace fluid loss throughout the day. Be sure you have enough cool drinking water at your job and drink 5 to 7 ounces of water every 15 to 20 minutes, even if you don't feel thirsty. Water temperature should be 50 to 60 degrees F for better absorption by the body. In conditions of heavy sweating, one quart of water per hour is recommended, not exceeding 1.5 quarts per hour or 12 quarts per day.
- Consuming drinks designed to replace blood fluids and electrolytes is okay, but never drink alcoholic beverages, since alcohol dehydrates the body.
- Except when treating specific disorders, salt supplements are not recommended, since too much salt can cause higher body temperature, increased thirst and nausea. Normally-salted meals provide adequate salt even in hot environments.

Summary

Some of the factors affecting heat stress are things you can control -- such as the amount of water you drink -- while others are not. For your safety, here is a summary of physical conditions that can hurt your body's natural ability to withstand high temperatures:

- Dehydration
- Exposure to high temperatures at night
- Fatigue
- Improper work procedures
- Lack of acclimatization
- Older age (over 40)
- Previous occurrence of heat stroke
- Poor physical conditioning
- Recent drug or alcohol use (within 24 hours)
- Skin Trauma (heat rash or sunburn)
- Wrong type or amount of clothing.
(Light, loose-fitting clothing is recommended)
- Diarrhea
- Recent immunizations
- Loss of sleep
- Medications
- Obesity